

CHAPTER 1: INTRODUCTION

1.1 Introduction

Air transport simply defined is travel through air—it can be by means of mechanized or non-mechanized devices like gliders, helicopters, fixed wing aircrafts, balloons etc. It is a tightly regulated network industry characterized by a natural monopoly of airport services providers, a small number of various other services providers and both vertical and complementary industry linkages. Air transportation is a major industry in its own right and it also provides important inputs into wider economic, political, and social processes (Button, 2008).

Findlay et al.(2004) enumerates the characteristics of the air transport as under:

- (a) Dominant state ownership, at least outside the US, and a higher degree of immunity from competition policy, partly on grounds of national security and pride;
- (b) Pervasive controls on entry, capacity and tariffs, on grounds of the size of investment needed and the presence of network externalities;
- (c) Existence of an international regime with the specific international organizations and institutions;
- (d) High degree of vertical integration, with de jure or de facto control and ownership links between the physical infrastructure and air and ground services.

These characteristics sum up the difficulties in opening the markets and introducing competition in air transport, especially in those sub-sectors services, which do not need traffic rights to operate. However progressive liberalization and deregulation has been instrumental to bring in some competitive spirit in the traditional manner of providing these services.

The price elasticity in air transport is low and hence the ability to exercise the market power is magnified. While the airlines provide the means of transport, airport

operators provide the central infrastructure and common facilities and crucial services like air traffic control, Communication and navigation, landing, parking etc. Traditionally many airport operators also provide the Ground Handling Services for the airlines and as such enjoy a monopolistic status. Growth in air traffic and developments in the sector have a cascading effect on the related stakeholder industries too, which inter alia, include travel, tourism and the sub-sector auxiliary services of air transport.

International Air Transport Association (IATA) (2017) presents the market development and market share analysis. World market share of Air Passenger of each region is given in Table 1.1:

**Table 1.1: Air Passenger Traffic and Region-wise World Market Share:
(Air Passenger Market Detail: October 2017)**

	World Share ¹	October 2017 (% Year-on-Year)				% Year -to-date			
		RPK	ASK	PLF (%- pt) ²	PLF (Level) ³	RPK	ASK	PLF (%- pt) ²	PLF (Level) ³
Total Market	100.0%	7.2%	6.2%	0.8%	80.8%	7.7%	6.4%	1.0%	81.6%
Africa	2.2%	5.7%	2.2%	2.4%	71.9%	6.7%	3.0%	2.4%	70.9%
Asia-Pacific	32.9%	10.1%	8.9%	0.8%	80.2%	10.0%	8.3%	1.3%	81.0%
Europe	26.4%	6.3%	4.5%	1.4%	84.3%	8.4%	6.4%	1.5%	84.3%
Latin America	5.2%	6.7%	4.9%	1.4%	82.5%	7.6%	5.8%	1.4%	81.9%
Middle East	9.6%	6.8%	5.4%	0.9%	69.4%	6.8%	6.9%	0.1%	74.8%
North America	23.8%	4.8%	5.3%	0.4%	83.3%	4.1%	4.0%	0.1%	83.7%

RPK: Revenue Passenger Kilometer, ASK: Available Seat Kilometer, PLF: Passenger Load Factor.

Note: 1: % of industry RPKs in 2016, 2: Year-on-year change in load factor, 3: Load factor level World share 1 October 2017 (% year-on-year) % year-to-date, 4: Note: the seven domestic passenger markets for which broken-down data are available account for 30% of global total RPKs and approximately 82% of total domestic RPKs

Source: IATA Air Passenger Analysis- October 2017

Liberalization, deregulation and market access in air transport has been reflected in prominent emergence of auxiliary services changing the structure of the industry. Low cost carriers (LCCs) experienced growth globally and in India during the period 2004-2008. The LCCs have made air transport affordable to the multitude of people across the world. ‘No frills’ policy and cost minimizing efforts of LCCs *inter alia*, included outsourcing of their GH requirements. With the growth in the sector, another impact is on the airport capacity. Existing capacities of infrastructure have been facing constraints. Studying the implications and effect of the growth in dynamic air transport industry is creating interest both in India and world across.

Aviation Sector has dual regulatory frameworks for safety, security and environment protection. Apart from national regulatory policies, the Members States that are signatory to the International Civil Aviation Organization (ICAO) Chicago Convention of 1944 have the compliance obligations to the various mandatory Standards and to adopt the recommended practices in civil aviation operation. The regulation of international civil aviation security is effected through the development and maintenance of Standards, Recommended Practices and Procedures applicable to international civil aviation activities, which are contained in 17 Annexes and PANS (Procedures for Air Navigation Services). These standards are complemented by Manuals and Circulars, which are providing guidance on their implementation.

In 1995, the General Agreement on Trade in Services (GATS) came into existence as the trade facilitating forum. It was one of the significant outcome of Uruguay round of negotiations. Trade in air transport traditionally, is through negotiated and mutually agreed bi-lateral service agreements. These Air Services Agreements (ASAs) specify the terms of operation called the traffic rights⁴, specifying the designated airline, number of seats, frequency, route etc. mentioned clearly. These are legally binding for the signatories.

⁴ Paragraph 6(d) of the Air Transport Annex of GATS states “traffic rights mean the right for scheduled and non-scheduled services to operate and/or carry passengers, cargo and mail for remuneration or hire from, to, within, or over the territory of a member, including points to be served, routes to be operated, types of traffic to be carried, capacity to be provided, tariffs to be charged and their conditions, and criteria for designation of airlines, including such criteria as number, ownership and control”.

The two most important principles of GATS - ‘Most Favoured Nation’⁵ and ‘National Treatment’⁶ as such, are not possible to be introduced in the trade in air transport through these ASAs. GATS has therefore exempted the air transport from its purview *except* for the three auxiliary services that are neither the traffic rights nor are they directly related to the exercise of the traffic rights. These are specifically mentioned in the air Transport Annex of GATS namely, the Aircraft Maintenance and Repair Services, Computerized Reservation Services and the selling and marketing of the air transport services.

While the International trade (WTO) and civil aviation bodies (ICAO), implore the contracting States for liberalization of the policies of their respective Governments to fulfil their obligations arising out of GATS Assembly Resolutions and the ICAO Convention, the efforts by a State are guided by the national economic and competition policies, foreign policy, security considerations and regulatory and legislative frameworks.

GATS consist of a set of general obligations that apply to measures affecting trade in services in WTO member countries, the schedules of specific commitments for each country; and a list of country-specific exemptions from Most-Favoured-Nation (MFN) Treatment. GATS provides a single organizational and legal focal point for governments to review and develop policy instruments that affect the many ways service providers in one country supply services to another. GATS provide another dimension in International compliance obligation for the Member States for liberalization of the trade in Services, characterized by the flexibility of scheduling the commitments with exemptions corresponding to national restrictive policies and legal regulatory framework.

1.2 Background for the Study

1.2.1 Ground Handling Services (GHS)

⁵GATS Article II: Most-Favoured-Nation Treatment –‘With respect to any measure covered by this Agreement, each Member shall accord immediately and unconditionally to services and service suppliers of any other Member treatment no less favourable than that it accords to like services and service suppliers of any other country’.

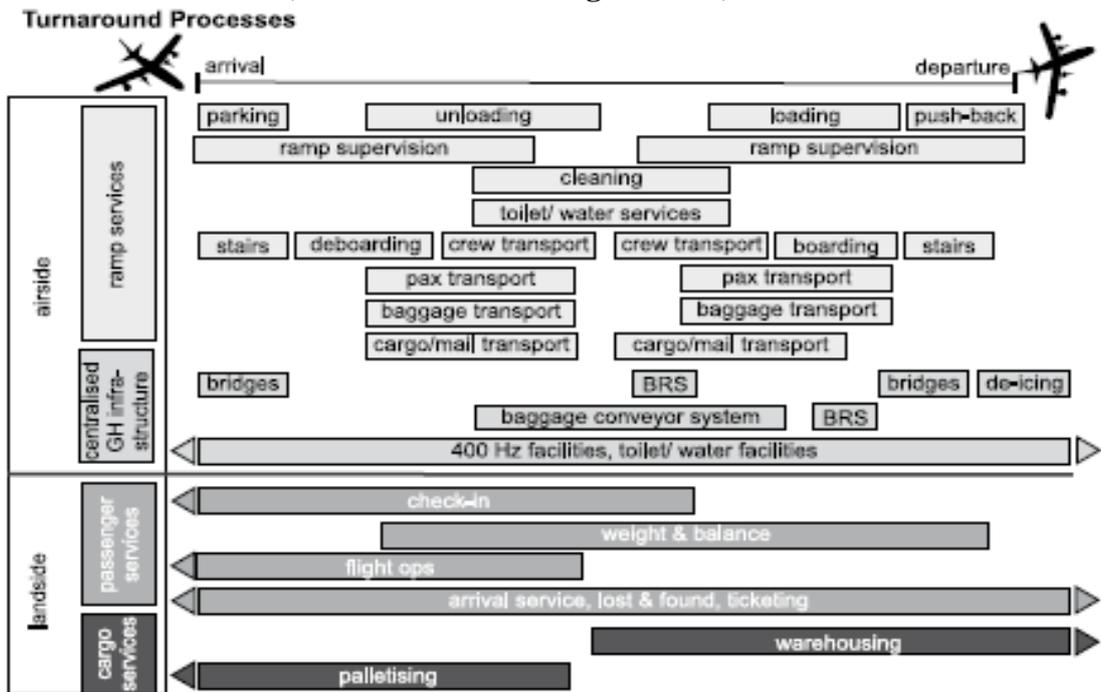
⁶GATS Article XVII: National Treatment-‘In the sectors inscribed in its Schedule, and subject to any conditions and qualifications set out therein, each Member shall accord to services and service suppliers of any other Member, in respect of all measures affecting the supply of services, treatment no less favourable than that it accords to its own like services and service suppliers’.

The predicted growth in the sector has been influencing the developments in the way the Air Services Agreements (specifying the traffic rights) are signed and implemented, impacting the regulatory environment as also the national and international policies affecting the air transport business environment.

The air transport, a typical network industry has all the characteristics of the regulated market: on the supply side there is a natural monopoly of the airport operators, 'economies of scale' has a major role in market access or sometimes acts as the barrier to entry and there is always the element of the public interest involved. On Demand side, regulation is frequently applied, where there are few substitutes. In the circumstances, the liberalization of trade in air transport services, makes an interesting study. From the preliminary review of the GATS provision, characteristics of the air transport and aviation sector, regulatory constraints, the emerging market of aviation Ground Handling Services (GHS), provides a promising area for studying the prospects of liberalization and introduction of competition.

There is no specific definition for ground handling services. The Ground Handling Services can be described as the services provided to aircraft, passengers and cargo at an airport. GHS is an essential service, without which aircraft cannot depart, and includes all the activities that take place in and around the aircraft and in the terminal building and/or cargo warehouse with regard to the load being carried on the aircraft (for the various regulatory definitions and the possible GATS classifications, Job (05)/300, pages 4-6). The ICAO Airport Economics Manual (Doc 9562) separates the ground handling function into terminal handling (Passenger check-in, baggage and freight handling) and ramp handling (aircraft handling, cleaning and servicing). The entire process of turnaround of an aircraft with the ground handling processes involved, is illustrated in the Figure 1.1 :

Figure 1.1 : Gantt Chart for Aircraft Turnaround Process (with Ground handling Services)



Source: Extracted from-Templin Cornelia, Presentation DWVG Hochschulwerkstatt-2006.

There is no confirmed official definition of ground handling. However, from an operational point of view, ground handling can be described as the services provided to aircraft, passengers and cargo at an airport.

IATA produced a Standard Ground Handling Agreement (SGHA), which is widely used. It lists the key elements of ground handling as in Table 1.2 :

Table 1.2: IATA Defined Key Elements of GH operations
IATA (SGHA) Classification of Ground Handling Activities-2003

S. No.	GH Activity
1	Representation, Administration and Supervision
2	Passenger Services
3	Ramp Services
4	Load Control, Communication and Flight Operations
5	Cargo and Mail Services
6	Support Services
7	Security

8	Aircraft Maintenance
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Source- IATA, 2003

The report of the Global Market Insight, 2017 states that the GHS industry is highly fragmented with about 1000 companies providing aircraft ground handling system market products and services. Swissport, SATS, John Menzies, Bhadra, Celebi, Air+Mak, and Dnata are among the prominent players. Other notable players in the industry include CargoTec, Cavotec SA, PrimeFlight, RampSnake and JBT AeroTech. Liberalization has opened new opportunities and facilitated greater market access for the outsourcing vendors specializing in various areas. Currently, above 50% of the services are being provided by the third-party providers. In the U.S., about 65% of the industry is serviced by main airlines' own handling companies. Each airport and country have different rules and processes for entering the industry. This provides cost-effective alternatives to small service providers to enter the industry. The aircraft ground handling system market players are focusing on strategic alliances with leading airline operators. For instance, in February 2017, Swissport signed a contract for ground handling services with Flydubai that includes passenger handling, baggage services, load control and operation coordination. In May 2017, Swissport entered a strategic alliance with TCS in order to enhance its technological infrastructure and to make optimum decisions for investments. In March 2017, SATS Ltd entered a strategic partnership with Hong Kong Airlines in order to manage their cargo and ramp handling services (GMI Report, 2017).

As regards India's aviation industry, Centre for Aviation –Asia Pacific (CAPA) in its Report on 'Aviation Outlook 2017/18, observed that a turnaround in the fortunes of India's aviation industry has occurred in 2016, after several very difficult years. Lower fuel prices combined with modest capacity growth and strengthening economic fundamentals were largely responsible for surging traffic and an improvement in airline financials in FY2016. Domestic traffic was up 21.2% while international grew by a more modest 7.7%. They have predicted that After a strong FY2016, traffic growth has accelerated further in FY2017, with India likely to overtake Japan this year to become the world's third largest domestic market behind the USA and China.

In reaching this milestone, India will have achieved average domestic traffic growth of over 15% per annum since the liberalisation of the sector commenced in FY2004.

Main Implication of such a growth has been the emergence of air transport auxiliary services markets like Ground Handling Services (GHS). One of the most crucial air transport operations, bringing the aviation into being, is the aviation ground handling (Ground Handling Services-GHS) consisting mainly the passenger handling, baggage handling, cargo handling, fuelling and catering apart from aircraft cleaning, loading and unloading, security, general administration and supervision. The background Note prepared by the Trade Council of WTO, GATS, has distinguished between the fuelling, catering, loading and security as very specialized services with a prominent limitation on competition in these areas. These GH services are distinctly apart from 'core' ground handling services, which are provided by the ground handling agents and consists of rest of the activities like passenger handling, baggage handling, and representation, administration and supervision and ramp services.

Ground handling services providers in India can be the airport operator, self-handling airlines, Third Party handler (airline providing ground handling services to other airline) and independent GH service providers (neither the airport nor airline is involved).

Thus there are four types of the GH service providers, as under:

- (a) Airport operator or its subsidiary providing the GHS,
- (b) Airlines self-handling and providing third party handling
- (c) A Joint Venture between any of the Airport operator, airlines or an independent GH Agency and
- (d) Independent GHS agencies—not aligned with either the airport or airlines.

Traditionally airlines prefer self-handling as it is considered the extension of their service and hence considered as a service quality indicator. Airline community however, have in recent years, started to reconsider whether ground handling was a core business. Today, it is estimated that globally, more than 50% of all handling is carried out by independents and this growing handling business is estimated to have more than 1,000 ground handling players worldwide. Aircraft Ground Handling System Market size was around USD 110 billion in 2016.

India has a growing aviation sector, however there is a dearth of research on Indian aviation. The research articles have been very few, apart from some reports, prepared by consultants, government department and professionally mostly by Centre for Aviation Pacific Asia (CAPA), India, providing sector specific market research. GHS market is studied with a view to examine the views and perception of stakeholders on possibility of introducing competition. The developments in aviation sector with a specific focus on the core aviation ground handling services are chosen to provide an Indian context through case studies. Even though it had limitations of time as also lack of access to the commercial data, this study covers the aviation Ground Handling Services (GHS), in Indian context, provides policy inputs and models for addressing the challenges of quality and efficiency of ground handling services due to rapid growth in air transport in India.

1.2.2 Development in Air Transport Services

It is seen that air transport is important globally, catering to the need for faster transport as compared to other modes of transport, carrying cargo especially of high value, perishables and emergency medicines, food and other items of survival to a crisis zone. The Air Transport Action Group (ATAG) provides an interesting metaphor- that If aviation were a country, it would rank 21st in the world in terms of gross domestic product (GDP), generating \$606 billion of GDP per year, considerably larger than some members of the G20 (and around the same size as Switzerland). By 2026, it is forecast that aviation will contribute \$1 trillion to world GDP.

The importance of air transport is evident in its social benefits as it contributes to sustainable development by facilitating tourism and trade, generating economic growth by creating jobs increasing tax revenues, facilitates the delivery of emergency and humanitarian aid relief and ensures swift delivery of medical supplies, organs for transplantation.

The said ATAG Study Forecasts suggest that, in 2032, there will be over 6.5 billion passengers and aviation will support 103 million jobs and \$5.8 trillion in economic

activity. However, if growth were to slow by just 1 per cent, the total number of jobs supported by the air transport sector (including air transport supported tourism) would be over 12.4 million lower than the base forecasts and the contribution of the air transport sector to world GDP would be \$661 billion (2012 prices) lower, with an additional \$352 billion lost through lower tourism activity.

National Transport Development Policy Committee (NTDPC) Report finds that India's current proportion of air cargo (relative to cargo overall) is low versus other developing nations, and total air cargo volume for all Indian airports still pales in comparison to a number of individual airports, both within the region and globally (e.g., Hong Kong, Incheon, Shanghai, Paris and Anchorage). That these individual airports handle more cargo annually than all Indian airports in aggregate reflects tremendous growth potential for India's air cargo sector, particularly in the light of strong projected economic growth and rising exports.

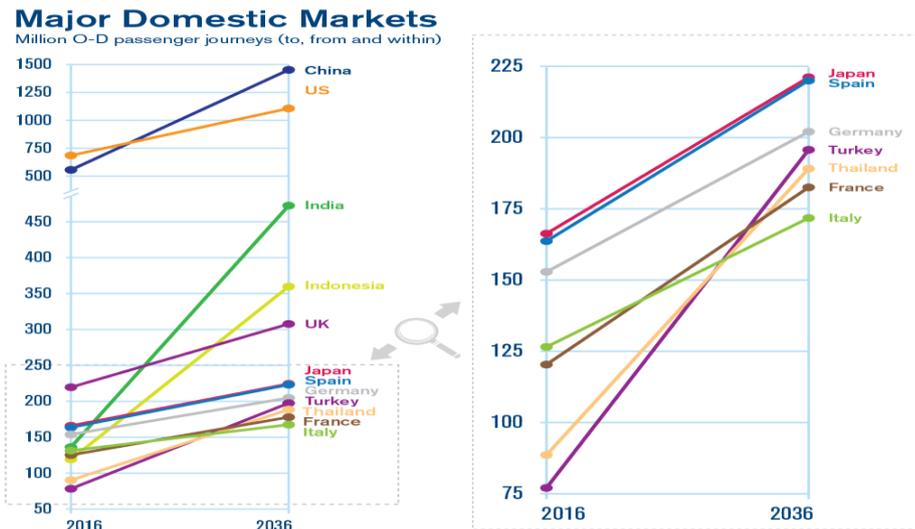
Table 1.3: Passenger Traffic Forecast for India

Year	Domestic (Millions)	Resultant CAGR (Per cent)	International (Millions)	Resultant CAGR (Per cent)	Total (Millions)	CAGR (Per cent)
2010-11 (Actual)	53.9	-	37.9	-	91.8	-
2015-16	94.1	11.8	59.4	9.4	153.5	10.8
2020-21	164.4	11.8	91.9	9.3	256.3	10.8
2030-31	437.9	11.0	217	9.1	654.9	10.3

Source: DGCA and MoCA estimates, 2012

The International Air Transport Association (IATA) expects 7.8 billion passengers to travel in 2036, a near doubling of the 4 billion air travellers expected to fly this year.

Figure 1.2: Top Ten Major Domestic Passenger Markets



Source: IATA Air Passenger Forecast- 2016-2036: Extracted from IATA Press Release No.: 55,

Date: 24 October 2017

Air transport for its characteristics of global network industry, has an effect on a large number of related sectors, having an economic activities impact of US\$ 2.3 trillion including direct, indirect, induced ones and tourism and hospitality sectors, according to the assessment of ATAG of aviation sector's social and economic benefits (-ATAG (2016). Developments in the regulatory environment and industry are noted with reference to its effect. Trade in services has a wider range of modes of delivery than that in case of goods⁷. Apart from usual requirement of simultaneous production and consumption, the services in many a cases, require proximity between the service provider and consumer.

India will displace the United Kingdom as the third-largest market in 2026, with Indonesia rising to number 5 in the world. Japan, Spain, Germany and France fall

⁷. *Cross-border (mode 1)*: services supplied from the territory of one Member into the territory of another. An example is software services provided by a supplier in one country through mail or electronic means to consumers in another country.

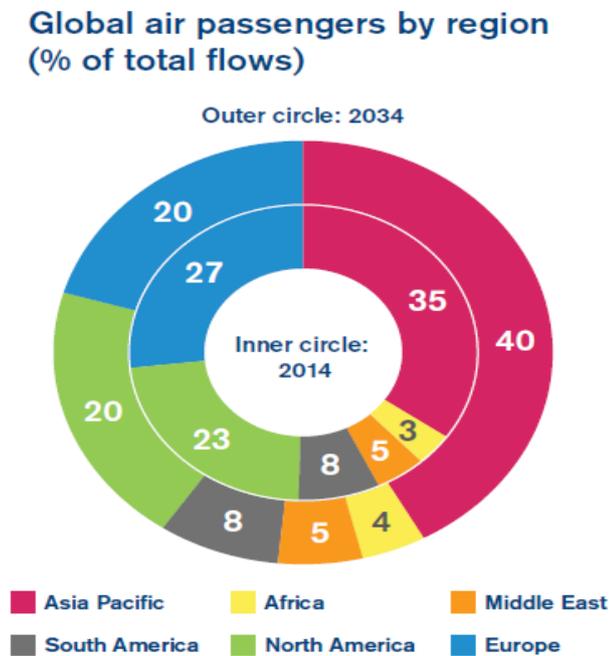
. *Consumption abroad (mode 2)*: services supplied in the territory of one Member title consumers of another. Examples are where the consumer moves, e.g. to consume tourism or education services in another country. Also covered are activities such as ship-repair abroad, where only the property of the consumer moves.

. *Commercial presence (mode 3)*: services supplied through any type of business or professional establishment of one Member in the territory of another. An example is an insurance company owned by citizens of one country establishing a branch by means of foreign direct investment (FDI) in another country.

. *Presence of natural persons (mode 4)*: services supplied by nationals of one Member in the territory of another. This mode includes both independent service suppliers and employees of the services supplier of another Member.

relative to their competitors, Italy falls out of the top 10, while Brazil moves from 10th place to 7th.

Figure1.3: Global Air Passenger growth by Region



Source: Extracted IATA Global Air Passenger Forecast by Regions- November, 2015
<https://www.iata.org/pressroom/pr/Documents/pax-forecast-chart-region.pdf>

Keeping in view the air traffic estimates and consequent demand for ground handling services, the GH services have been taken up for specific study. Role and impact of the GHS services has been assessed considering importance of operational costs and on-time performance to an airline, the advantages to the airport operator of GHS provision among other airport operation and traffic control services and policy requirements for a competitive GHS market.

As the national policies and regulatory framework define the market access for trade in services, a question arises as to how the GH markets can be opened for facilitating trade and market access for international competition. Although GATS provides a forum for trade in services on a rationale of equal opportunity and fair competition, the emerging aviation ground handling services are not covered under GATS. Another important issue is that of effect of competition in such network industry with the complementary services and monopoly/ oligopoly market structure. Safety in aviation

operations in a competitive GHS market has a significant bearing on policy consideration to grant market access. For trade in GH services, a harmonized regulation across national borders for safety and security for GHS becomes another important issue.

Market access in GHS cannot be studied in isolation of the potential impact of growth in air traffic on the airport capacity, consequential to market access and competition. Whenever the demand exceeds the capacity, there are various challenges arising out of the airport capacity constraint, like congestion and delays. Delays have multiple economic and cost implications- Soft and hard costs of delay, loss of revenue for the airlines and skewed arrival-departure ratios. Delays affect an aircraft turnaround⁸ time, which in turn affects the total aircraft movement through an airport, impacting its operational efficiency and the revenue earned. Delays are the main obstacles for ‘on-time’ performance of an airline, and as such are indicator of the service quality for both the airport operator and the airline operators. Delays have a cascading effect and the ground operations being responsible for the readiness and release of aircraft for take-off, can be a driver of recovery and reduction of delays at the gate. Using a diagnostic model developed by a case study of IGI Airport New Delhi, improving the total aircraft movement a has been attempted within the existing airport capacity by using stylized⁹ categories of ‘Delays’ as inputs, identifying the factors causing such delays that can be controlled to improve the performance. An Operational Performance Efficiency Index has been developed using a data envelopment analysis technique, which enables internal benchmarking of airport operations throughput¹⁰ in a 24 hrs cycle (a Decision Making Unit-DMU) of an airport.

⁸ Aircraft turnaround operation refers to the preparation work of an inbound aircraft for a following outbound flight that is scheduled for the same aircraft. Accordingly, activities of aircraft turnaround operation include both inbound and outbound exchange of passengers, crew, catering services, cargo and baggage handling. Technical activities in turning around an aircraft include fuelling, routine engineering check and cabin cleaning.

⁹Stylized facts or categories of a variable could be defined as empirical regularities (or some characteristic features that occur in the data). However, they do not need to be rigorously exact everywhere and all the time. They are useful because they help us to test implications of a theory or to choose between alternative theories. We can compare conclusions of a theory with stylized facts (empirical behaviour of economic variables) and judge usefulness of that theory.

¹⁰There are two commonly used definitions of airfield capacity: “throughput” and “practical capacity”. The **throughput definition** of capacity is the rate at which aircraft can be handled—i. e., brought into or out of the airfield, without regard to any delay they might incur. This definition assumes that aircraft will always be present waiting to take off or land, and **capacity is measured in terms of the number of such operations that can be**

Considering the limited scope and coverage of air transport services under GATS, the growing significance of the emerging sub-sectors like ground handling throws up many issues and challenges. One of the objectives of this study therefore has been to examine the treatment of the emerging important sub-sector market of aviation ground handling with reference to its status under GATS. Deliberations on the subject and various reports by the Trade Council, offers and requests pertaining to GHS and the debate and arguments during the Five-yearly Mandatory Review of the Air Transport Annex of GATS were studied. The focus is also on exploring whether the ICAO and GATS can provide complementary forums for the growth and competitive trade in these emerging auxiliary services? Recommendations have been made suggesting ways of resolving the definitional, operational and procedural issues vis-à-vis the trade in these services under the Air Transport Annex of GATS.

Air transport has many characteristics that set it apart from the traditional services. Firstly, it in itself is traded as the service and also as a mode of service for delivering the goods as also services (tourism).

As the sub-sector of air transport, the GHS are also a part of the network industry and are subjected to the stringent regulatory compliances under the national security and safety regulations as also the international service standards adopted by the airlines. Due to anomaly of inclusion/non-inclusion of GHS provision in the ASAs, Member States are divided in their views as to whether GHS are ‘traffic rights’ and/ or directly related to exercising the traffic rights or not. Without clear definitions and product category classifications, international trade facilitation in these services through GATS forum is debatable.

Literature review revealed that very little research is carried out in case of Indian aviation sector, despite having a sustained growth in the sector over decades. There are very few research articles and a few college dissertations on the Indian air transport, especially the ground handling subject. Examining the effect of liberalization and feasibility of creating competition in the Indian GH services market, is a timely and valuable addition to the literature. India has adopted a fresh civil

accomplished in a given period of time. Practical capacity is the number of operations (take offs and landings) that can be accommodated with no more than a given amount of delay

aviation policy in mid 2016. However, a comprehensive regulatory framework for service delivery and standards of GHS is yet to be finalized.

The theme that runs through this study as such, has been the study of emerging sub-sector Ground Handling Services. Focus is on exploring the perceptions, views of stakeholders in addressing the issue of competition in ground handling services market and the effect of growth in air traffic at operational level. The study had led to a policy model based on feedback and suggestions of the stakeholders to introduce competition in the GHS market. Market access and trade in services are integral part of economic growth. As air traffic grows, another consequential challenge is the management of airport capacity constraints. Challenges are faced at these levels: (i) at national policy level, for opening up the markets for aviation ground handling services (ii) at an operational level of airport, the problem is of airport capacity constraints due to growing traffic and consequent congestion and delays. Delays impact the total throughput (movement of an aircraft) affecting the revenue for the airport operators and loss of service quality for the airlines. (iii) Review of the Air Transport Annex is dragging on for over a decade which raises a question whether GATS can timely address the demands of the dynamic sector. Some states have undertaken commitments for GH services and for ‘Other Support Services’, while others are debating and discussing the interpretation of mandate of the Review, status of GHS etc. In the circumstances, identifying factors influencing the probability of a decision to schedule a commitment is useful.

1.3 Research Objectives and Hypotheses

Market access and creating competition in GHS market requires a policy change. The probability of voluntary compliance for a successful policy implementation is more when the policy is formulated with due consideration to the stakeholders views, perceptions and concerns. The first objective thus was to assess the qualitative perception of main stakeholders regarding the issues of competition and market access in the ground handling services market and based on the results, formulate a policy model based on the findings for necessary policy adjustments for creating competition in the aviation ground handling services markets.

Liberalization of the air transport markets and growing competition has cascading implications at operational level of an airport. Delays in aircraft movement to and from the airport put a strain on the airlines' on-time performance (OTP) and does adversely affect the traffic and aeronautical revenues of the airport operator. The second objective was to study the effect of select delays on the total throughput¹¹ so that it should be possible to identify the factors including the ground operations, leading to these delays which can be segregated into those that can be strategically managed to enhance the total aircraft movements- throughput of an airport. A case study of Indira Gandhi International Airport (operated by the Delhi International Airport Limited), New Delhi was undertaken to study the stylized categories of delays so as to develop a model to work out the operational performance efficiency Index (PI) of an airport.

As the Member States (developed, developing and least developed economies) are divided in their opinion about taking commitments under the Air Transport Annex of GATS for the newly emerging prominent sub-sector services, specifically the GHS, while some States are presenting offers and requests for GHS, another objective was to examine the factors influencing the probability of a decision to undertake a commitment under GATS.

To summarize, this study had the following objectives:

- (a) To study the issues with respect to bringing competition in GHS markets. To explore and carry out qualitative assessment of the perception of main stakeholders regarding competition and market access in GHS in India
- (b) To work out a model for necessary policy adjustments for competition in Aviation Ground Handling Markets in India which could be applied *mutatis mutandis* to other States wherever necessary

¹¹ There are two commonly used definitions of airfield capacity: "throughput" and "practical capacity". The **throughput definition** of capacity is the rate at which aircraft can be handled—i. e., brought into or out of the airfield, without regard to any delay they might incur. This definition assumes that aircraft will always be present waiting to take off or land, and capacity is measured in terms of the number of such operations that can be accomplished in a given period of time. Practical capacity is the number of operations (take offs and landings) that can be accommodated with no more than a given amount of delay

- (c) To study the comparative effect of stylized categories of delays on throughput of an airport and identify the factors including ground operations contributing to the delay categories that have considerable effect on the operational performance (total aircraft movement), and which can be managed and reduced to improve the throughput performance.
- (d) To explore the issues and challenges and study the options for the emerging sub-sector GH services to be brought under the purview of the Annex of GATS and to find out if there are any feasible ways to resolve the issues flagged by the members and tackle the challenges highlighted during the second mandatory five-yearly review of the Annex of GATS.
- (e) To study the relationship between the economic status of a State and such economic indicators of trade in services and the probability for a decision of the state to schedule a Commitment under the Air Transport Annex of GATS.

Hypotheses: The study posits following hypotheses:

Hypothesis 1:

Airport capacity, market structure, domestic regulation and national policies influence the market access and competition in Ground Handling Services.

Hypothesis 2:

Operational Performance efficiency index (PI) of an airport in terms of total aircraft movement is affected the most by reactionary delays, turnaround time and average delays at the Gate.

Hypothesis 3:

If a Country has a higher GDP per capita, greater share of employment in service sector and higher growth rate of imports, it will have higher probability for scheduling a commitment under GATS for air transport.

1.4 Research Methodology

Chapter 3 gives detailed account of the research methodology adopted for this study. However, here the research methodology used is mentioned in brief. A mixed

methodology combining the exploratory qualitative and quantitative methods is adopted. Case studies of India's GHS market and the Indira Gandhi International airport, New Delhi have been carried out with quantitative analysis undertaken for internal benchmarking of efficiency in terms of total aircraft movement and to improve airport performance index by managing the factors contributing towards delays.

At the time of undertaking this study, India did not have a current civil aviation policy nor any dedicated policy for the ground handling services market. The GHS policy circulars issued in 2007 and 2010 were being contested in the Court of Law by the airlines association, demanding right to self-handle and an open market for GHS. It was decided to explore the policy and regulatory requirements if a decision to open the GHS market is considered.

Brief descriptions of the Methodology used in each of the three parts of the study are given below:

1.4.1 Aviation Ground Handling- A case study of Indian GHS market

A qualitative research methodology was adopted. Views and concerns of various stakeholders were obtained through surveys, interviews and focus group discussions. Primary data so collected was analyzed in two ways: cross tabulation for rank assigned in order of perceived importance of particular type of GHS and percentage of respondent for each category of GHS. Secondly, the analysis of the causes of incidents/accidents at Indian airports was carried out to assess the safety risk factors in open and competitive GH service operations.

A perception response regarding the importance of each category of GHS for the main stakeholders was obtained, including safety and security regulators, airport security force and others (from Air traffic control, IT departments of airport). Details are given in Chapter 4. Perceptions are mixed and complex depending on the services provided- e.g. airport operator providing operation and communication navigation services and also GH services, airlines that are self-handling and say, also providing Third party GH services to others and the independent GHS providers.

A Policy model was developed for introducing the competition in the GH services market, based on the qualitative and empirical results of the study.

1.4.2 Implications of liberalization on Operations: Operational Performance Index (PI) and GHS - A Case study of IGI New Delhi.

According to the study Fricke and Schultz (2009) ground operations processes are a part of the critical turnaround path such as de-boarding, fuelling, cleaning, catering and boarding, and the effects of any delay in these immediately propagate an accumulating delay through the ATM network. They found that reasons for flight delays can be allocated to six main categories (type of reason): Rotation, Air Traffic Flow Management /Air Traffic Control (ATFM/ATC), Airport Authorities, Handling, Technical, and Weather. These major categories cover up to 85% of potential flight delays and out of these factors contributing to the flight delays, Ground Handling operations contributes 10% to the delays. It was observed that in most of the cases delay was partly compensated by means of improved ground process efficiency.

For this part of the study, the impact of various types of delays on the throughput (total air craft movement) was assessed and the factors causing such categories of delays that can be controlled were identified, so that the operational efficiency can be improved within the existing capacity of the airport.

A two- stage analysis was carried out. In first stage, the Data Envelopment Analysis (DEA) methodology, originally proposed in Charnes *et al* (1978), was used to assess the relative efficiency of a number of entities (entity-A day of 24 hrs) using a common set of in-commensurate inputs to generate a common set of in-commensurate outputs. The DEA Model developed is input oriented—to minimize the inputs (identified categories of delays in this case) to obtain the identified objective of the throughput- i.e. output of the model.

The delays are categorized, grouping the IATA Delay Codes (Annexure-II) as the stylized categories. The stylized categories of delays were the independent variables taken as the ‘inputs’. The total throughput is the total number of operations (aircraft movement) per defined period (24hrs cycle), as the indicator for the operational performance at existing airport capacity. This is the ‘Output’ and dependent variable.

In the second stage, the OLS regression model was used. The Operational Performance Index (PI) for an airport gives a measure of internal benchmarking. Based on the types and quantum of delays (independent variables) a PI was worked

out for IGI airport. Such PI can be worked out for any airport with the help of this model. It however has some limitations, as it takes into account only a few select factors causing delays, while the operational performance of the airport is dependent on many other factors¹². Considering the scope of this study one indicator as ‘aircraft movement’ was chosen from the Core performance indicator areas for an airport. A safety incident analysis was also carried out, for identifying the factors responsible for such incidents, keeping in view the ‘Safety and Security’ as the performance indicators of the GH services.

1.4.3 Aviation Ground Handling Services and General Agreement on Trade in Services (GATS)

The GHS is a developing market of considerable magnitude. Opening of this market depends on the market structure (monopoly or oligopolistic) and capacity constraints of an airport. If the GHS market is to be made competitive, there is a limited scope to providing a transparent and impartial entry into this market. One way is to utilize the GATS platform. This study has been carried out in two parts- first exploratory research on the aviation ground handling and possibility of its inclusion in the Air Transport Annex of GATS and second, empirical research to assess the impact of factors influencing the probability of undertaking Commitment under GATS by a Member State. For the first part, the literature, WTO reports, working and research papers have been reviewed and deliberations going on in the second mandatory five-yearly Review of the Air Transport Annex were studied. For the second part, as the

¹²The ACI Guide to Airport Performance Measures of February 2012 gives the Performance Indicators (PIs) for six key performance areas:(i) Core –Indicators=1. Passengers 2. Origin and Destination Passengers 3. Aircraft Movements 4. Freight or Mail Loaded/Unloaded 5. Destinations— Nonstop, (ii) Safety and Security –Indicators= 1. Runway Accidents 2. Runway Incursions 3. Bird Strikes 4. Public Injuries 5. Occupational Injuries 6. Lost Work Time from Employee Accidents and Injuries (iii) Service Quality, Indicators= 1. Practical Hourly Capacity 2. Gate Departure Delay 3. Taxi Departure Delay 4. Customer Satisfaction 5. Baggage Delivery Time 6. Security Clearing Time 7. Border Control Clearing Time 8. Check-in to Gate Time, (iv) Productivity/Cost Effectiveness, Indicators= 1. Passengers per Employee 2. Aircraft Movements per Employee 3. Aircraft Movements per Gate 4. Total Cost per Passenger 5. Total Cost per Movement 6. Total Cost per WLU 7. Operating Cost per Passenger 8. Operating Cost per Movement 9. Operating Cost per WLU, (v) Financial/Commercial, Indicators= 1. Aeronautical Revenue per Passenger 2. Aeronautical Revenue per Movement 3. Non-Aeronautical Operating Revenue as Percent of Total Operating Revenue 4. Non-Aeronautical Operating Revenue per Passenger 5. Debt Service as Percentage of Operating Revenue 6. Long-Term Debt per Passenger 7. Debt to EBITDA Ratio 8. EBITDA per Passenger and lastly (VI) Environmental, Indicators= 1. Carbon Footprint 2. Waste Recycling 3. Waste Reduction Percentage 4. Renewable Energy Purchased by the Airport (Percent) 5. Utilities/Energy Usage per Square Meter of Terminal 6. Water Consumption per Passenger.

GHS are not covered under the GATS, the commitments made under air transport are studied as a proxy to identify the factors responsible for scheduling commitments.

For the study of air transport services and commitments scheduling by the Countries under GATS, data was collected of all the variables used in the analysis from different sources for all the 147 WTO member countries. The reference period has been selected keeping in view the requirement of considerable length of period to be studied and to have near latest available data. The period selected for the analysis is thus 2000 to 2012. Binary variable has been used to represent commitments as the dependent variable.

Based on the World Bank categorization¹³ of the countries on the basis of income, countries have been categorized as low income (*li*), lower middle income (*lim*), upper middle income (*umi*), high income non-OECD countries (*hinonoecd*) and high income OECD countries (*hioecd*). Other independent variables used are: GDP per capita, Employment in Services, Services trade as a percentage of GDP (*trade services*), Annual growth (in %) of exports and imports of goods and services (*export*) and (*Import*). Logistic regression technique was used to analyse the data. Further, the robustness of the model has been established using a Probit Model.

1.5 Research Findings

Topic-wise critical essays in Chapters 4, 5 and chapter 6 give details of findings. The same are given in brief for a quick perusal, in the following sub-sections:

1.5.1 Aviation Ground Handling- A case study of Indian GHS market

The surveys, FGDs, Interviews have revealed complex dynamics amongst the airport operator enjoying a monopolistic status, the GHS providers and its users/customers- the airlines.

¹³For the current 2017 fiscal year, low-income economies are defined as those with a GNI per capita, calculated using the World Bank Atlas method, of \$1,025 or less in 2015; lower middle-income economies are those with a GNI per capita between \$1,026 and \$4,035; upper middle-income economies are those with a GNI per capita between \$4,036 and \$12,475; high-income economies are those with a GNI per capita of \$12,476 or more.

It was found that the existing GH services suppliers (Airports Authority of India, Air India and their Joint Ventures) were not in favour of opening the markets and bringing in competition. Fragmentation of market share and loss of revenue for already razor thin profit margins was the main concern. It was also mentioned that entry of GH agencies with their manpower and/or equipment could lead to congestion and safety risks in operation on the air side of the airport. Safety in ground operations was assessed as the most important factor by all stakeholders. Airlines and some GH agencies indicated preference to opening of the GHS market to competition, self-handling, while airport operator and regulators were apprehensive of safety and security risks.

Any attempt to introduce competition in this market was perceived differently. In brief, airport operators viewed increase in competition negatively, airlines preferred self-handling, perceiving the passenger handling at check-in as the most significant face to face 'moment of truth' interaction for a positive impression on consumers. Airlines indicated core GH as an extension of their service product and were positively inclined towards the competitive GH market with wide consumer choice and to maintain the service quality. However, the low-cost carriers have shown preference for outsourcing or third party handling as a cost effective option. Independent GHS providers were looking forward to having a bigger share of the contestable market have voted for opening the market and removing the factors acting as the entry barriers.

India is found to operate a mixed GH market structure and the GH regulation is put on hold due to court case. The existing agencies providing GH services were allowed to continue to operate. It was also found that the domestic self-handling airlines and Low cost airlines are hiring the contractual GH manpower from ancillary agencies and outsourcing the GH operations, to third party / other GHS providers. There are a number of agencies operating at Indian airports, which were found to be small businesses providing a part of auxiliary services to the customer airline, basically only the manpower suppliers. The major GHS providers have invested in equipment and trained manpower. It was found that airport operators are weary of the manpower supplying agencies. As per the views of airport operators, the manpower more often than not, is neither skilled nor trained, overworked and usually a safety risk during

operations. All stakeholders indicated the need for safety regulatory standards, supervision and safety audits for the GH agencies.

The study results indicated that if the competition is to be introduced in GHS markets, it is necessary to have a strong, clear GH policy and necessary prescribed safety and security standards for GH services in place, with well-defined regulations for monitoring and safety, security oversight audit procedures. With such a regulatory framework in place, it is expected that the competition can be maintained in a monopolistic/oligopolistic GHS market and industry will automatically re-structure to address the requirements and the constraints in a best possible manner. As the airport capacity (both terminal and more importantly the airside) is the most severe constraints at operational level, even if there is a competition in GHS providers, it may require policy intervention and industry cooperation to have the safety and security concerns duly addressed.

1.5.2 Implications of liberalization on Operations: Operational Performance Index (PI) and GHS - A Case study of IGI New Delhi.

In the study of IG International Airport, New Delhi, the DEA and regression analysis was carried out for the daily aircraft rotation data. A 'Performance Efficiency Index' (PI) was developed to benchmark the operational efficiency of an airport based on the types of delays encountered in aircraft movements each day (24hrs). The airport capacity utilization in terms of total aircraft movement per day as the PI, based on the identified delay constraints works as an indicator of service quality. The model so developed, benchmarks the days as Decision Making Units (DMUs) comparing their output for efficiency frontier.

Results of DEA Regression Model show that various types of delay in the categories selected in our model explains 76 per cent of the variation in the dependent variable i.e. the total throughput. Types of delays- Type 5-Air Traffic Flow Management (ATFM) Restriction, Type 6 –Airport & Govt. Authorities and Type 7 - Reactionary delays contribute relatively significantly. Most of the causal factors for such types of delays are emergent and difficult to manage at instant operational level. The crew shortage, en-route demand/capacity problems, ATC staff shortage, restriction at departure and destinations airports or Cabin Crew rotation require long term solutions

and for some at national policy level. The standardized coefficients indicated that Type 7 category of delay factor is most important having a negative impact on the output i.e. the aircraft movements. These are reactionary delays due to load connection- awaiting load from another flight, Through Check-in Error- Passenger, Baggage, Aircraft rotation- Late arrival of aircraft from another flight or previous sector, Cabin Crew rotation- awaiting cabin crew from another flight, Crew Rotation- awaiting crew from another flight (flight deck or entire crew), Operations Control- re-routing, diversion, consolidation, aircraft change for reasons other than technical reasons. The standardized coefficients show the negative impact of the selected four categories of independent variables. The least important is the average time of delay at the gate. Type 5- delays due to Air Traffic Flow Management (ATFM) Restriction and Type 6 - delays due to Airport & Govt. Authorities, follow thereafter as the factors having significant effect on the total throughput.

1.5.3 Aviation Ground Handling Services and General Agreement on Trade in Services

One of the aspects of introducing competition in the ground handling market is whether the international trade facilitation platform like GATS can be useful for the purpose? GHS market is growing and there have been increase in number of independent services providers all around the world. Keeping in view the estimates of growth in air traffic in India, it is imperative that consequential growth in demand for GHS, these services are provided with adequate assurance for service quality and efficiency. In a monopolistic market (airport providing the GHS or predominant airline- usually the national carrier, self-handling and providing third party GHS), there is negligible competition and the consumer airlines do not have any choice to engage a GHS provider. This leads to rent-seeking attitude and deterioration of service efficiency and quality. At some International metro airports, GHS is an oligopolistic market. To bring in competition the GHS market need to be open to new entrants with least entry barriers. The States that schedule the Commitment under GATS have an obligation to ensure transparency, equal treatment to all members in terms of market access.

Result of the logit regression showed that countries with higher GDP per capita, greater share of employment in service sector and higher growth rate of imports have higher probability for commitments. Greater share of employment in service sector indicates the potential and preparedness for growth in this sector. Increase in imports of services could also be attributed among other factors to the inability of these States to fully meet the domestic requirements- either for lack of skilled manpower resources, focus on manufacturing goods, national policies, domestic resource scarcity, market structure etc. Thus it can be concluded that the commitment for the Air transport services depends on the economic growth, preparedness of the service sector and among other reasons like Socio-economic policies, political will, want of resources, skilled manpower, insufficient services supply to meet the domestic requirements.

1.6 Contribution of the Study

This study was able to contribute through the exploratory approach to the consolidation of issues and concerns in addressing the status of the newly emerging and growing GHS market by providing a policy model for introducing competition. It has also substantially added to the body of knowledge on Indian aviation sector and specifically the Ground Handling Services market.

This study is the first of its kind, exploring and presenting a detail perspective of stakeholders on the issue of market access and competition in Indian GHS market in India. Research in Indian aviation market is very limited and this study gave an insight to the policy makers on challenges in opening of GHS market to competition and its implications for the safety in GH operations. The results and the policy model recommended here are very relevant and timely addition to the exercise of policy formulation for the GHS in India.

New civil aviation policy was announced in May 2016. The GH policy notification was issued in December 2017. This notification is only a slight improvement on the earlier notifications of 2007 and 2010, as now the domestic as well as foreign airlines have been given the self-handling options for GHS involving passenger interface and excluding any security functions. This new GH policy has opened the GHS market to a limited extent only and the safety regulator has not yet prescribed the service

standards, safety management system for GHS. The recommended policy model in this study, however, emphasized an *a priori* fine-tuning of the regulatory requirements to ensure prevention of monopolistic competition, safety safeguards through certifications of GH agencies, training institutions, and licensing of personnel and recommendations of service standards, minimum technical specifications and maintenance requirements for ground support equipment etc.

Another first for the Indian aviation sector research is the second part of this study. It is the study of Indira Gandhi International Airport, New Delhi, in terms of its operational performance efficiency measure and benchmarking for the total aircraft movement per day as the performance efficiency index (PI) based on delay data. The model provides a simple diagnostic tool to identify the factors causing certain types of delays. This enables the manager to identify the factors causing such delays that can be controlled and reduced at the operational level and the throughput i.e. the total aircraft movement through the existing capacity of the airport can be improved. Further the predictorial regression model can be used to find out the PI, based on the data collected on the specific stylize categories of delays occurring at a given airport. The important contribution of this part of the study is that identifying the factors responsible for the delay. In a competitive environment, the airport operator can control and reduce the identified factors causing the delays and differentiate its service through efficient movement of aircraft.

The results validate the results of the first part of the study- that the human factor is very important for safe ground operations. It also supports the proposed policy model with suggested implementation strategy to provide a strong regulatory framework to maintain the quality in all ancillary and supporting business units and processes like training, licencing of the personnel, certification of the GH agencies, training institutes.

Another contribution of this study was to provide at policy level, a model to ensure a smooth transition of existing market structure (which is mostly monopolistic and to some extent oligopolistic at some international airports), to a more competitive one. The suggested policy involves tackling the issue from base upwards— model framework at regulatory level, certification and licensing of personnel, equipment and

certification of training schools and instructors to licensing of GHS personnel, ensuring efficient delivery of GHS to the prescribed service standards.

As regards the use of GATS platform for market access in GH services is concerned, this study lists out the issues and concerns. Present impasse at GATS council deliberations and negotiations is due to Lack of definitions, whether GHS be covered under the Air Transport Annex of GATS, varied interpretation of the mandate for the review of the Annex, lack of legal procedures to amend the Annex. Keeping in view the role and functions of the two international forums like ICAO and GATS, the study recommended that ICAO being the technically experienced organization and an international regulator of all aspects of civil aviation to ensure safety and security in operations could provide all needed definitions. This could then be discussed and adopted at GATS review meetings for the Annex and expedite the process of long awaited decisions on expansion of coverage of the Annex. The Study also recommended that the Council for trade at GATS need to provide clarifications on procedural and interpretative issues.

The study has been able to explore the relationship between the status of the economy of a State and the likelihood of its decision to undertake commitments under the Air Transport Annex of GATS. World Bank classification of countries based on income levels and such select economic indicators has been used. The study has shown that the probability of the country going for the commitments increases if the GDP per capita, employment in services and imports of goods and services of a country increases. Further the probability of commitment decreases for the countries falling in lower middle income, upper middle income and high income non-OECD countries with respect to the reference category high income OECD countries. These results are indicative of the probable behaviour of the States, if in future the Air Transport Annex is expanded to cover the GHS.

1.7 Chapter Scheme

The thesis is presented in following chapters:

The Second Chapter presents the ‘Literature Review’ undertaken for the aspects of International trade in GHS. The Literature is reviewed for developments in air transport sector, GHS and especially, the issues and challenges of market access and competition in Indian context.

Methodology has been presented in the third Chapter. A combined multi-methods process has been chosen and exploratory, qualitative and quantitative research has been undertaken to study whether GHS market can be opened to competition and that of status of GHS under GATS. Effect of select services economic indicators on probability of decision to undertake the commitment under GATS is explored through proxy commitments undertaken by Member States under the Air Transport Annex of GATS. The implications have been given at two levels- National and Operational level, with a commentary on the status of GHS under GATS..

The next three chapters present this work in three essays: Chapter 4: Aviation Ground Handling- A case study of Indian GHS market; Chapter 5. Implications of liberalization of air transport on Operations: - A Case study of IGI New Delhi, and Chapter 6: Aviation GHS and GATS

Chapter 7 summarizes the Findings and presents conclusion and recommendations for future research.